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OBSERVATIONS

On the USE of

SPECTACLES, &c.



1753



OBSERVATIONS

On the USE of

SPECTACLES, &c.



[K. (R.)]

OBSERVATIONS

On the USE of

SPECTACLES,

Extracted from the



Writings of the most celebrated Authors
who have wrote on OPTICKS.

WHEREIN

Are contained Rules for chusing of Spectacles
and Glasses proper for remedying all the
different Defects of SIGHT.

In a LETTER to a Friend.

LONDON.

Printed for P. STEVENS, near Stationers-Hall; R. BALDWIN, in Pater-Noster-Row; J. JEFFERIES, in Ludgate-Street; B. BOURN, at the Royal-Exchange; G. WOODFALL, at Charing-Cross; R. WILLIAMSON, at Liverpool; J. BERRY, at Manchester; W. EATON, at Farmouth; J. TEAST, at Bristol; J. LORD, at Wakefield; S. SIMMONDS, at Sheffield; Messrs KINCAID and DONALDSON, at Edinburgh; and J. SMITH, at Dublin.

By [K. (R.)]

OBSERVATIONS
On the USE of
SPECTACLES
Advertisement.

Writings of the most celebrated Authors
who have wrote on OPTICKS
GEORGE STERROP's,
W H E R E I N

*At the Archimedes and One Pair of Golden
Spectacles, in St. Paul's Church-Yard,
(that End next Cheapside) LONDON,*

AN Y Person may be suited with Spectacles,
made of the finest Glass, and ground in the
most perfect Manner, either for preserving of the
Eyes, or supplying the Defects occasioned by
Sickness or Age. Where Persons who live in the
Country may be suited, by sending an Account,
as directed in this Book.

He likewise makes all Sorts of Reading-Glasses;
Concaves for Short-sighted Persons, suited to every
Degree; Microscopes, Telescopes, Barometers,
Thermometers, with all other Sorts of Optical
Instruments, of the Newest Invention. Also
Mathematical and Philosophical Instruments, and
Globes of all Sizes.

J. BARRY, at Manchester; W. BRYAN, at London;
J. TAYLOR, at Bristol; J. LLOYD, at Newcastle; S. SIM-
MONDS, at Sheffield; Messrs KIRKLAND and DONALD-
SON, at Edinburgh; and J. SMITH, at Dublin.



OBSERVATIONS

On the USE of

SPECTACLES, &c.

S I R,

IN Compliance with your Desire to know my Opinion of the Use of Spectacles, occasioned by the Failure of your Sight, I shall present you with all the Observations, immediately relating to the Subject, that are to be found in the Writings of those who are most esteem'd for their Knowledge in Op-

B

ticks,

ticks, that, by knowing the Sentiments of such Persons, whose Judgment may be depended on, you may be better able to determine for yourself in an Affair which gives you so much Concern. Indeed, I flatter myself, that the Perusal of these Quotations will effectually remove your Doubts, and not only reconcile you to the Use of Spectacles, but furnish you with such Directions, as may enable you to reap all the Advantages of that excellent Invention.

It is needless to trouble you either with an Anatomical Account of the Eye, or an Explanation of the Nature of Vision, any farther than is absolutely necessary to the present Enquiry, these Subjects having been fully illustrated in those Lectures

Lectures which you formerly attended.

To proceed then : I shall, as briefly as I can, acquaint you with the Antiquity of Spectacles, from Mr. *Molyneux's* Treatise on Dioptricks, and also with his just Remarks upon the extensive Usefulness of that excellent Contrivance.

“ That Optick Glasses were not
 “ known till about the thirteenth
 “ Century, says he, is evident from
 “ the universal Silence of all the
 “ Writers preceding it, who have
 “ treated upon Philosophical Subjects ; and, doubtless, a Contrivance of that universal Use, so
 “ beneficial to all old Men, both
 “ in Reading and Writing, could never have been so conceal'd, as that

“ not the least Footsteps thereof
 “ should remain to Posterity.

“ Therefore, as we must neces-
 “ sarily allow this Invention due to
 “ the Moderns, the next Enquiry
 “ will be, where to fix it.

“ Monsieur *Menage*, an ingeni-
 “ ous *French* Author, informs us,
 “ that, from a Passage in a *Greek*
 “ Poem, the Manuscript of which
 “ is now in the *French* King's Li-
 “ brary, it has been thought, that
 “ Spectacles were invented about
 “ the middle of the twelfth Cen-
 “ tury. It is however certain, that
 “ in the thirteenth Century they
 “ were commonly known and used.
 “ The most learned Monsieur
 “ *Spon* in one of his Books inserts
 “ a Letter from Signior *Redi* to
 “ *Paulus Falconerius*, concerning
 “ the

“ the Time when Spectacles were
 “ invented ; which he fixes about
 “ the latter End of the thirteenth
 “ Century, upon the Testimony
 “ of a Manuscript Chronicle in
 “ *Latin*, in the Library of the
 “ Friars of St. *Catherine's* at *Pisa*.

“ The *Italian Dictionary de la*
 “ *Crusca* on the Word *Ochiale* has
 “ this Remark ; That Frier *Jour-*
 “ *dan de Rivalto*, in a Sermon writ-
 “ ten in the Year 1305, says, that
 “ it is not twenty Years since the Art
 “ of making Spectacles was found
 “ out, and that it is indeed one of
 “ the happiest and most useful In-
 “ ventions in the World.

“ From all which it is certain,
 “ that Spectacles were well known
 “ in the thirteenth Century, and
 “ not

“ not much before. But, who the
 “ Man was that first hit upon this
 “ lucky Thought, may yet be que-
 “ stion’d ; ’tho it seems to me most
 “ probable, that our Countryman,
 “ Frier *Roger Bacon*, gave the
 “ first Hint towards this useful Dis-
 “ covery ; a Discovery of such
 “ universal Benefit and Advantage
 “ to Mankind, that, were there no
 “ other Use of Dioptricks, than the
 “ Invention of Spectacles, for the
 “ Help of defective Eyes, I should
 “ think the Advantage Mankind re-
 “ ceives thereby, inferior to no
 “ other Benefit whatsoever, not ab-
 “ solutely requisite to the Support
 “ of Life. For, as the Sight is
 “ the most noble and extensive of
 “ all our Senses, as we make the
 “ most frequent and constant Use
 “ of

“ of it in all the Actions and Con-
 “ cerns of Human Life ; surely
 “ that Instrument, that relieves the
 “ Eyes when decay’d, and supplies
 “ their Defects, rendering them use-
 “ ful, when otherwise almost use-
 “ less, must needs, of all other, be of
 “ the greatest Advantage. Without
 “ it, how melancholy must be the
 “ Condition of him, who only
 “ enjoys the Sight of what is im-
 “ mediately about him ! With
 “ what Disadvantage must he en-
 “ gage in most of the Employments
 “ of Life ! Reading would be trou-
 “ blefome, the Dangers of War
 “ would be multiplied, and the Bu-
 “ siness of Commerce render’d te-
 “ dious and burthensome. And so
 “ likewise, on the other Hand,
 “ how forlorn would the latter Part
 “ of

“ of most Men’s Lives prove, un-
 “ less Spectacles were at Hand to
 “ help our Eyes, and a little form’d
 “ Piece of Glas supply’d the De-
 “ cays of Nature ! The curious
 “ Mechanick, engaged in any mi-
 “ nute Work, could no longer fol-
 “ low his Trade than until the fif-
 “ tieth or sixtieth Year of his
 “ Age ; the Scholar no longer con-
 “ verse with his Books, or with an ab-
 “ sent Friend in a Letter : All after
 “ would be a melancholy Idleness,
 “ or he must content himself to
 “ use another Man’s Eyes for every
 “ Line. Thus forlorn was the Con-
 “ dition of most old Men, and
 “ many young, before this admi-
 “ rable Invention ; which on this
 “ very Account can never be priz’d
 “ too highly.”

The

The same Author proceeds (Page 208) to draw Inferences from Propositions laid down in the former Part of his Treatise on the Structure of the Eye, which prove in what Manner defective Eyes are reliev'd by the Application of Glasseſs:

“ Therefore, (ſays he) for helping
 “ decay'd Eyes, we learn that a
 “ convex Glaſs muſt be made uſe
 “ of: For, theſe ſeeing diſtant
 “ Objects diſtinctly, and near Ob-
 “ jects confuſedly, muſt uſe ſuch
 “ Glasseſs for Reading, &c. which
 “ will make near Objects appear
 “ diſtinctly: For, as the Cryſtalline
 “ Humour is become too flat for
 “ near Objects, that is, wants Con-
 “ vexity, we are to help it by add-
 “ ing the artificial Convexity of a
 “ Glaſs.

C

“ But

“ But then our Enquiry must be,
 “ What is the particular Convexity,
 “ suited to this or that particular
 “ Eye? And, because reading small
 “ Print, or working small Works,
 “ as they oblige us to converse with
 “ near Objects, are the chief Em-
 “ ployments in which Spectacles are
 “ requisite; the Enquiry must be
 “ made chiefly for these Purposes.

“ When we find that we begin
 “ to require Spectacles, let us make
 “ choice of those that have the flat-
 “ test Convexities, that magnify the
 “ least; these are usually call'd
 “ young Spectacles; and the best are
 “ those with which we can read a
 “ small Print distinctly, with the
 “ Book farthest from the Eyes; for
 “ these Spectacles are most proper,
 “ and

“ and will preserve the Sight longer
 “ than any.

“ Again ; if you cannot read a
 “ moderate Print but at a confi-
 “ derable Distance, and you want
 “ Spectacles to enable you to read
 “ it at the usual Distance, *viz.*
 “ about a Foot, or a little more ;
 “ procure a Pair of Glasses of such
 “ a Convexity, as will shew an Ob-
 “ ject placed before them at the
 “ Distance of about a Foot di-
 “ stinctly.

Agreeably to this, Sir *Isaac New-*
ton observes in his Treatise on Op-
 ticks, (Page 13) That, “ if the Hu-
 “ mours of the Eye decay by Age
 “ or otherwise, so as to make the
 “ Cornea and Coat of the Crystal-
 “ line Humour grow flatter than
 “ before, the Light will not be re-

“fracted enough, and, for Want of
 “sufficient Refraction, will not con-
 “verge to the Bottom of the Eye,
 “but to some Place beyond it ;
 “and consequently will paint at the
 “Bottom of the Eye a confused
 “Picture ; and, according to the
 “Indistinctness of the Picture, the
 “Object will appear confused. This
 “is the Reason of the Decay of
 “Sight in Persons advanced in
 “Years, which is mended by Spec-
 “tacles of a due Degree of Con-
 “vexity : For they supply the Want
 “of Convexity in the Eye, and,
 “by increasing the Refractions,
 “make the Rays converge sooner,
 “so as to convene distinctly at the
 “Bottom of it.”

It is necessary to observe here,
 that every Eye has its particular
 Focus,

Focus, or certain fixed Point, where, by its refracting Power, the Images of all external Objects are form'd: This is usually found on that Part which is called the Retina; and, whenever it happens otherwise, we say, that that Eye is defective in the Formation of the CrySTALLINE Humour: And as in some of these the Images of Objects do not reach the Retina, which is the Case of short-sighted Persons; so in others it is found beyond it, as in long-sighted Persons; which Deficiencies are easily supplied by Means of Concave and Convex Glasses.

“ To explain this: The Progress
 “ of the Rays of Light proceeding
 “ from an Object is described in the
 “ first

“ first Figure in the Plate annex’d ;
 “ where (*Fig. I.*) ABC represents
 “ the Eye, and DE the CrySTALLINE
 “ Humour. Suppose f b an Ob-
 “ ject placed before it, emitting
 “ Pencils of Rays from its several
 “ Points f , g , b , which Rays, by
 “ the refracting Powers of the Hu-
 “ mours contain’d in the Eye, are
 “ made to converge, and meet to-
 “ gether in a Focus at z , a Point
 “ in the Retina ; by which means
 “ an Image of the Object $b g f$
 “ will be found there ; tho’, because
 “ the Pencils cross each other in
 “ passing thro’ the Pupil, it will be
 “ inverted.

“ This is prov’d by Experiment ;
 “ for, if we cut away the back Part
 “ of the Eye, and apply a Paper
 “ there,

Fig I.

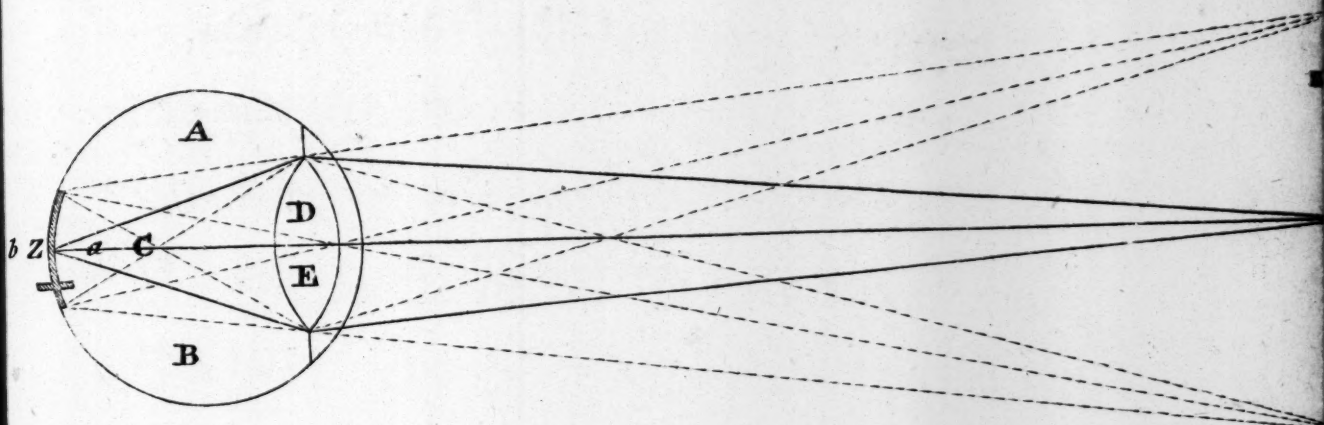
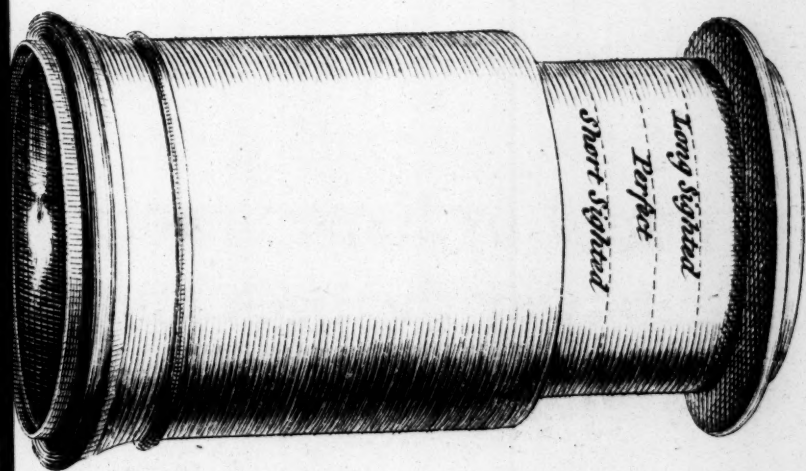


Fig II





“ there, we shall see the Images of
“ external Objects plac’d upon it,
“ and very distinctly, provided no
“ Light is suffered to fall upon the
“ Paper, except that which passes
“ thro’ the Humours of the Eye.

“ This is more easily explain’d
“ by the common Experiment of
“ the Dark Chamber, or *Camera Ob-*
“ *scura*, which is a Contrivance to
“ exhibit the Representation of such
“ Objects, as may be seen from a
“ Window, upon a plain white
“ Surface held before the Window
“ within the Room. For this Pur-
“ pose a convex Lens must be fix’d
“ in a Hole of the Window-Shut-
“ ter : And then, if no Light be
“ suffer’d to enter the Room, but
“ what passes through the Hole, and
“ a Sheet

“ a Sheet of white Paper is held op-
 “ posite to the Hole, at such a
 “ Distance, that the Rays proceed-
 “ ing from the Objects abroad, and
 “ passing thro’ the Glafs, may be
 “ collected into their respective
 “ Foci, we shall have the Images
 “ of all the Objects which lay be-
 “ fore the Hole represented upon
 “ the Paper, inverted ; but in a
 “ much more lively and exact
 “ Manner than can be done even
 “ by the Pencil ; and not only the
 “ Objects, and their Situation, but
 “ (what is peculiar to this Sort of
 “ Painting) their Motion, also will
 “ be expressed.” *Rowning* on Op-
 ticks, P. 58.

Proper Glasses conveniently fra-
 med for this Purpose, and also an
 arti-

Artificial * Eye, or Pocket *Camera Obscura*, as described in the Plate annexed, (*Fig. 2.*) which represents the Appearance of an Object upon the Retina both of a perfect and an imperfect Eye, and in what Manner, by the Application of different formed Glasses, the Eye is relieved, are made by *George Sterrop* in *St. Paul's Church-Yard*.

Dr. *Smith*, in his Remarks upon certain Propositions laid down in his Complete System of Opticks, (Remarks, Pag. 9.) says, “ Those Spectacles are best, which are the least convex of any that will suit the Eye. These are the Glasses which I have computed, and therefore

* This, with two different form'd Glasses, and printed Directions how to use it, all contained in one Case, is sold for Six Shillings.

D

called

“ called the properest. For, since
 “ they cannot be put quite close to
 “ the Eye, the less they magnify the
 “ Pictures of Objects upon the Re-
 “ tina; and also oblige the Eye to
 “ to that Conformation of its Coats
 “ and Humours, which is requisite
 “ for seeing Objects as near as it can
 “ and consequently may prevent
 “ the Eye from growing more and
 “ more long-sighted: For, when
 “ the Picture upon the Retina is
 “ very large, it need not be quite so
 “ distinct, as when it is smaller,
 “ to convey an Idea of the same
 “ Number of Parts of an Ob-
 “ ject; and, consequently the Eye
 “ will be more at Liberty to re-
 “ cede from that Conformation
 “ which is proper for the Glass,
 “ and to relapse into that to which
 “ it

“ it inclines, and which is only
 “ proper for seeing more remote
 “ Objects.”

From hence it is evident, that, when a Person finds himself obliged to place his Book, or any Object, at a greater Distance from his Eyes than he used to do, (the general Indication of Decay of Sight) he requires Spectacles; and, by neglecting to use them, strains and weakens his Eyes, and thereby does them the greatest Injury: Whereas, by using such Spectacles as are properly adapted to the Eyes, he may view small Objects with as much Pleasure, as he did before he knew the Want of them, and thereby preserve his Eyes, and prevent them from growing worse.

It is generally observed, that the Persons, who need the Assistance of Spectacles the soonest, are Husbandsmen, Sportsmen, Sailors, and others, whose Eyes are mostly employed upon remote Objects; and that the Short-sighted, who require this Aid later in Life, are found among Scholars and Mechanicks, who are daily conversant with Books and other near Objects: So that the Eye, like every other Organ, is inclined to keep to that Conformation, to which it has been most accustomed.

Enough has been said to explain the general Usefulness of Spectacles, and in what Manner they relieve the Sight, and likewise at what Time it is necessary to begin to wear

wear them, from the Arguments of Authors in the highest Repute.

But, as no Rules have been given for the Choice of Spectacles, except what relate to the Focus, and the different Degrees of magnifying, it may be proper to point out the common Imperfections of Spectacles; and thereby we shall know what are the Properties of those which are to be preferred to all others: By which Means any Person may be capable of chusing for himself, and detecting the Faults so frequently to be met with, by which the Eyes suffer much Injury, and the Benefit arising from this useful Invention is in a great Measure defeated.

These Imperfections arise either from the Materials of which the

Glasses are made, or from the Unskilfulness or Carelessness of the Workmen employed in making them.

I shall consider these two Articles distinctly. And,

First, As to the Materials: Nothing is more common than to meet with Spectacles, the Glasses of which are of a dark, muddy Colour, (which are imperfectly ground) and generally mounted in Copper-Frames silvered, of which very large Quantities are every Year imported from abroad, and dispersed all over *England*, and which are very detrimental to the Eyes.

And all Glass of a blue or green Colour, which is so predominant in Crown-Glass, is by all Means to be rejected: For, as in the natural
Eye

Eye of those Persons who are afflicted with the Jaundice, it is well known that all Objects appear with a yellowish Cast; so in the artificial Eye (for as such a Pair of Spectacles may be considered) all Objects will be tinged with the prevailing Colour of the Glass, which will immediately appear upon Trial: That Glass, therefore, must be preferred to all others, which represents the Object in its natural Colour; or otherwise Spectacles would be much less valued, and on that Account would be very disagreeable, and in some Cases injurious, by deceiving us in our purchasing Commodities, of which their Colour is a chief Property, by which we can judge of their Goodness.

And,

And, as it appears from the abovementioned Authors, that the only Use of Spectacles is to correct the refractive Qualities of the Eye, when by Accident or Age that Power is become defective, and not to misrepresent Objects by giving them a false Colour, but to represent them as they really are; so this can only be obtained by *White* or *Chrystal* Glass, so called from its Resemblance of Crystal in its Clearness and Transparency; which, when perfectly wrought, and properly suited to the particular Focus of the Eyes, is entirely free from any false Glare or Colour, and is on these Accounts the best of any; and the easiest Way of examining the Colour is by laying the Glass on a Piece of the whitest Paper.

But,

But, as even This is not free from Faults common to all Glafs, such as Specks and Veins, these may be discovered by holding it up against the Sky, or the Light of a Candle ; or, more perfectly, by placing a Candle at a few Yards Distance from you, and moving the Glafs from the Eye, 'till you find it full of Light, by which you will easily discover its Defects.

Secondly, As to the Imperfections arising from the Workmanship, they are chiefly Scratches in the Glafs, occasioned by the Want of Polishing, which will be easily discovered by the foregoing Experiment of the Candle : But the most material Defect is a bad Figure, or the representing the Object distorted and confused, which may be best dis-

E

covered

covered by viewing two parallel Lines drawn on a Piece of Paper : For, if the Glas has a good Figure, the Lines will appear regular and straight ; but, if it has a bad Figure, irregular, and curved towards the Edges of the Glas.

Spectacles made of *Brazil Pebbles* are most to be esteemed ; for they have all the Properties of White Glas, but in a much superior Degree ; and, as they are much harder, they will receive a better Polish, and are not so liable to be scratched or broken.

However, the surest Way of being suited with proper Spectacles, is to apply to those Persons who are the Makers, and are furnished with the greatest Variety of Glasses of different *Foci* ; by whom even Persons

sons who live at a Distance may, by sending an Account of the *Focus* of their Eyes, or at what Distance they can best read a small Print, be fitted to a sufficient Degree of Exactness.

As it may be thought necessary, that I should say something concerning the Defects of those Persons Eyes, who are purblind or short-sighted ; I shall briefly assign the Cause of Short-sightedness, and then point out the Remedy : But, as this is to be relieved in the same Manner as the opposite Defect, except that, instead of a convex Glass, a concave must be made use of, I need not be so particular as before, the same general Directions being necessary in the Choice of both.

For, as it was observed before of the Eyes of those Persons who require convex Glasses, that their Defects proceed from a Flatness, or the Want of a sufficient Degree of Convexity in the Crystalline Humour; so in the present Case the Defect arises from too great a Protuberancy, or Convexity in the Crystalline Humour, which makes near Objects appear distinct, but distant Objects confused. For, the Refractions being too great, the Rays converge before they come to the Bottom of the Eye *, and therefore the Picture made there, and the Vision caused by it, will not be distinct, unless the Object be brought so near the Eye, that the

* As at *a* in Figure 1. instead of ; and in those of the contrary Defect at *b*, instead of .
Place

Place where the converging Rays convene may be removed to the Bottom, or that the Plumpness of the Eye may be taken off, and the Refractions diminished, by a concave Glass of a due Degree of Concavity *.

With regard to what is the most proper Degree of Concavity, we can only discover that by trying several Glasses of different *Foci*, observing to make Choice of those which are the least concave of any that will fit the Eye †.

I have enlarged the more in this Letter, in order to recommend Spectacles to such Persons, who, though they require them, and, for Want of using them in Time,

* *Newton's Opticks.*

† *Molyneux's Dioptricks.*

do their Eyes great Mischief, yet are unwilling to use them, either because they are unacquainted with their Properties, or apprehend that, when they begin to use them, they can never leave them off; an Argument which upon the least Consideration will appear to have no Force, unless to oblige us to use them the sooner: For, though bad Spectacles are detrimental to the Eyes; yet, in the Opinion of the Authors I have quoted, good ones relieve and preserve the Eyes; and, by enabling us to see Objects better, at once prove why, when we have accustomed ourselves to use them, we should not leave them off.

Thus, Sir, I have endeavoured to discharge the Obligation you
were

(31)

were pleased to lay on me; and, as you were desirous I should be as particular as was necessary to render these Remarks of Use to others as well as to yourself, I need make but little Apology for having taken up so much of your Time: If they meet with your Approbation, I shall think myself sufficiently rewarded for the Pains I have taken in collecting them, and am,

S I R,

Your most obedient

London, Jan. 9,
1753.

humble Servant,

R. K.